

Mem. Natn. Sci. Mus., Tokyo, (16), December 1, 1983

The Archaic Trechine Beetles of the Genus *Oroblemus**

By

Shun-Ichi UÉNO**

上野俊一**：原始的な形質を残すキタメクラチビゴミムシ類

The genus *Oroblemus* is a small group of microphthalmic trechine beetles previously recorded only from the northernmost part of Honshu, the main island of Japan. It has been rather inadequately known due to the great rarity of its constituents, but is taxonomically important as it forms an intermediate link between alate oculate species and apterous anophthalmic ones in the phyletic series of *Trechoblemus*. The only other genus comparable to *Oroblemus* in this respect is *Oroblemites* S. UÉNO et PAWŁOWSKI (1981, p. 148) known from the Tian Shan Mountains in Soviet Central Asia.

Late in the summer of 1982, Mr. Yoshiaki NISHIKAWA and I made a collecting trip to the mountains distributed on the Japan Sea side of northeastern Honshu. My main purpose was to clear up certain taxonomic problems concerning the group of *T. oreas*, an important but difficult species-group in the genus *Trechiamia*. It was mostly attained by an adequate collection of the trechines from nine different localities, which included several new forms. What was unexpected was that a new *Oroblemus* was found as a by-product on the western slope of Mt. Chôkai-zan, a recent volcano widely distant to the south from the theretofore known range of the genus.

Still more unexpected was the discovery of a fourth species of the same genus on the Island of Sado off the northern coast of central Honshu. This island, about 857 km² in area, is about 32 km distant in a bee-line from the nearest point of the mainland, and is the sixth largest of the Japanese islands. Its fauna is generally similar to that of the opposite side of the mainland, but is peculiar in containing some remarkable endemics on the one hand and in lacking many common species on the other. What kind of flightless trechines occur there has long been a matter of our concern, and the island has been repeatedly visited by some entomologists for looking for endemic trechines, both in mountain forests and in abandoned mine adits. However, the trechine beetle at last discovered on the island lives in the upper hypogean zone at the highest part of the main ridge. To my utmost surprise, it does not bear any direct relationship to the species distributed to the Japan Sea side of

* This study is supported in part by the Grant-in-aid for Scientific Research No. 00434039 from the Ministry of Education, Science and Culture, Japan.

** Department of Zoology, National Science Museum, Tokyo
国立科学博物館 動物研究部

central Honshu, but is allied to the *Oroblemus* discovered on Mt. Chôkai-zan, which is widely distant to the northeast from the Island of Sado.

In the present paper, I am going to describe the two new species of *Oroblemus* thus obtained. As is the case with *O. sparsepilifer* S. UÉNO (1975, p. 115, fig. 1), these new species are also different from the type-species in certain critical points. Therefore, a revised description of the genus seems needed for covering all the four known species, which are unusually diverse, especially in the mode of pubescence on the body surface. The abbreviations used herein are the same as those explained in other papers of mine.

Before going into further details, I wish to express my hearty thanks to Dr. Kintaro BABA and Mr. Yoshiaki NISHIKAWA, who kindly rendered every possible aid to my field survey. I am also greatly indebted to Mr. and Mrs. Masaji KATO and their daughter, Kyôko, without whose unfailing and heartfelt help, the zoogeographic situation of the Island of Sado as seen from the trechine fauna could never be clarified.

Genus *Oroblemus* S. UÉNO et A. YOSHIDA, 1966

Oroblemus S. UÉNO et A. YOSHIDA, 1966, Bull. Natn. Sci. Mus., Tokyo, 9, p. 77; type-species: *Oroblemus caecus* S. UÉNO et A. YOSHIDA, 1966. — CASALE & LANEYRIE, 1982, Mém. Biospéol., 9, pp. 21, 101.

Small trechines of elongate body form belonging to the *Trechoblemus* complex, readily recognized on the following combination of morphological features: apterous and depigmented; head large, covered with coarse reticulated microsculpture; frontal furrows entire and rather widely distant from each other; eyes small and flat though imperfectly faceted, either pubescent or at least with vestiges of minute hairs; genae pubescent; mandibular teeth large and sharp, premolar tooth present on right mandible; labial suture always distinct even when the mentum is imperfectly fused with submentum, which is octosetose; mentum tooth large and broad, either bifid or deeply emarginate at apex; maxillary palpus with plurisetose penultimate segment; pronotum devoid of fringing cilia on the side borders, with hind angles not much produced even if sharp; scutellum distinct; elytra more or less ciliated on the side borders, which are neither denticulate nor distinctly serrate at the humeral parts; striae superficial though distinctly punctate, scutellar striae present, apical striae usually turning inwards at the anterior end and approaching to stria 3 but sometimes directed to stria 5; intervals more or less pubescent; two setiferous dorsal pores present on stria 3; humeral set of marginal umbilicate pores nearly regular; protibiae entirely pubescent, each rarely with an imperfect groove on the external face; aedeagus more or less elongate and arcuate, flattened in apical part, with broad apical lobe and elongate basal part, the latter of which bears a sagittal aileron; inner sac armed with two copulatory pieces articulated at the bases but devoid of sclerotized teeth.

Body elongate, more or less depressed above, and depigmented; inner wings absent or extremely reduced; colour yellowish brown to light reddish brown.

Head large, with deep entire frontal furrows rather widely distant from each other, subangulate at middle and widely divergent before and behind; dorsal surface covered with

short scattered pubescence in *O. caecus* but completely glabrous in the other species; micro-sculpture always distinct, coarse, and mostly isodiametric; supraorbital setae normal, lying on lines more or less convergent posteriorly; eyes small and completely flat though imperfectly faceted, either covered with short erect pubescence or at least with vestiges of a few minute hairs; genae convex and pubescent. Labrum transverse, widely emarginate at apex, and sometimes bisinuate at the central part of the emargination. Mandibles short and stout, with the inner teeth large and sharp; right mandible tridentate, while the left is bidentate. Mentum either free or imperfectly fused with submentum, with the labial suture always distinct throughout; mentum tooth broad and porrect, either bifid or deeply emarginate at apex; submentum provided with a transverse row of eight setae; ligula usually rounded at apex, rarely truncated, with two long setae at middle and three shorter ones on each side; paraglossae long, thin and slightly arcuate, extending much beyond ligula. Maxillae short and thick, with strongly arcuate lacinia sharply pointed at the tip. Palpi short and stout; apical segments subconical and more or less longer than penultimate ones; penultimate segments widely dilated apicad and plurisetose in maxillary palpus, moderately dilated apicad and quadrisetose in labial palpus. Antennae more or less stout, usually subfiliform but rarely submoniliform (*O. caecus*), and usually somewhat dilated towards apices.

Pronotum small, transverse, sparsely covered with short suberect pubescence in *O. caecus*, provided only with vestiges of several microscopic hairs in *O. sparsepilifer*, and completely glabrous in the other species; discal setae present in *O. subsulcipes* and *O. katorum*, but absent in the other species; sides entirely bordered and not ciliated, with the ante-basal sinuation variable though not deep; marginal setae normal, the posterior one being slightly removed forwards; hind angles usually rectangular or a little obtuse, but sometimes sharp though not much produced; median line clearly impressed, more or less widening in basal area; apical transverse impression vague, sometimes wrinkled; basal transverse impression fairly deep, usually continuous, laterally merging into basal foveae, which are large, deep, and shallowly extend antero-laterad; postangular carinae absent. Scutellum small though distinct.

Elytra elongated ovate, usually subparallel-sided, and usually depressed on the disc, without transverse depression on basal peduncle; intervals densely covered with short suberect pubescence in *O. caecus*, more sparsely covered with longer pubescence in the other species, the hairs becoming ranged in one or two irregular longitudinal rows on each interval in *O. subsulcipes* and *O. katorum*, and forming an irregular longitudinal row in *O. sparsepilifer*; shoulders distinct; sides reflexed, neither denticulate nor distinctly serrate, but more or less fringed with short hairs, at least at the humeral parts; striae superficial though distinctly punctate, stria 8 deeply impressed at least behind the middle set of marginal umbilicate pores, rarely sulciform throughout (*O. sparsepilifer*); scutellar striole present, usually short though very long in *O. katorum*; apical striole short but deep, usually curved inwards at the anterior end and approaching to or even joining stria 3, but sometimes directed to stria 5; stria 3 with two setiferous dorsal pores at $1/6-1/5$ and $1/2-3/5$ from base respectively; preapical pore situated at the apical anastomosis of striae 2 and 3, at about or a little behind the level of the terminus of apical striole, and obviously closer to suture than to apex;

marginal umbilicate pores aggregated and almost regular, though the first pore of the humeral set is sometimes a little isolated from the other three.

Prosternum either covered with short pubescence (*O. caecus*) or fairly long hairs (*O. katorum*) at the median part, or with several, fairly long hairs (*O. sparsepilifer*), or with only the vestiges of a few pubescence (*O. subsulcipes*); sternites either pubescent at the median parts (*O. caecus* and *O. katorum*) or almost glabrous (*O. sparsepilifer* and *O. subsulcipes*), each usually with a pair of setae; anal sternite with a pair of marginal setae in ♂, with two pair of them in ♀. Legs not very long, either stout or fairly slender; protibiae slightly bowed and entirely pubescent, each either simple (*O. caecus* and *O. katorum*) or longitudinally depressed on the external face (*O. sparsepilifer*) or imperfectly grooved on that face (*O. subsulcipes*); in ♂, two proximal segments of each protarsus rather widely dilated, stoutly produced inwards at apices, and furnished beneath with sexual adhesive appendages.

Male genital organ small; aedeagus more or less elongate and arcuate, flattened in apical part, and more or less curved ventrad at the basal part; apical lobe broad, simply rounded at the extremity; sagittal aileron always present; inner sac armed with two elongate copulatory pieces articulated at the bases, of which the right one is always longer than the left; no sclerotized teeth; styles variable, each bearing three or four setae at apex.

Range. Northeastern Honshu except for the Pacific side, and the Island of Sado off central Honshu, Japan.

Notes. As can be seen in the renewed account given above, the members of *Oroblemus* are considerably variable in the mode of pubescence on the body surface, in the presence or absence of discal setae on pronotum, and even in the structure of protibiae. Every grade is found in the reduction of pubescence, from the most archaic type shown by *O. caecus* to the most advanced condition exhibited by *O. sparsepilifer*. The pronotal discal setae are absent in *O. caecus* and *O. sparsepilifer*, but exist in *O. subsulcipes* and are well developed in *O. katorum*. In this and some other respects, especially in the structure of buccal organ, the new species of *Oroblemus* approach to *Stygiotrechus* S. UÉNO (1958, p. 123, 1969, 1973, 1976, 1980), whose members are widely distributed in the northwestern areas of Japan west of Lake Biwa-ko.

However, *Oroblemus* can be readily distinguished from *Stygiotrechus* by the presence of reduced eyes which are either pubescent or provided with vestiges of minute hairs, and by the absence of suprafrontal setae, of minute hairs fringing the side borders of pronotum and of denticles or serration on the humeral borders of elytra. Its male genitalia are unique among the East Asian members of the *Trechoblemus* complex in having two long copulatory pieces articulated at the bases. Thus, *Oroblemus* is a natural group not directly related to any of the anophthalmic genera of the phyletic series. As was already pointed out (UÉNO & PAWŁOWSKI, 1981), its closest relative may be *Oroblemmites* of the Tian Shan Mountains, although the two genera must have been descended independently from *Trechoblemus*-like ancestors.

Key to the Species

- 1 (2) Body surface wholly covered with short suberect pubescence; pubescence on elytra dense, not forming any longitudinal rows; length 3.00–3.40 mm; (Mt. Iwaki-san)*O. caecus* S. UÉNO et A. YOSHIDA.
- 2 (1) Head and pronotum either glabrous or practically glabrous, with vestiges of several microscopic hairs on pronotum at the most; pubescence on elytra longer and sparser, more or less forming irregular longitudinal rows.
- 3 (4) Fore body larger, EW/PW 1.37, with shorter antennae reaching basal three-tenths of elytra; pronotum without discal setae; pubescence ranged in an irregular longitudinal row on each elytral interval; length 3.50 mm; (Kitaguni-yama of the Osorézan Mts.).....*O. sparsepilifer* S. UÉNO.
- 4 (3) Fore body smaller, EW/PW 1.43–1.46, with longer antennae at least reaching basal three-sevenths of elytra; pronotum with at least a pair of discal setae; pubescence on elytra irregular but showing a trend of forming one or two longitudinal rows on each interval.
- 5 (6) Smaller species; body less parallel-sided, with smaller head and more convex elytra; pronotum wider at base, with sharp hind angles and only a pair of discal setae; scutellar striole short; length 3.00 mm; (Mt. Chôkai-zan).....*O. subsulcipes* sp. nov.
- 6 (5) Larger species; body elongate and subparallel-sided, with larger head and more depressed elytra; pronotum narrower at base, with hind angles either rectangular or a little obtuse; two or three pair of discal setae present; scutellar striole very long, almost reaching the level of the anterior dorsal pore; length 3.35–3.60 mm; (Mt. Donden-san and Mt. Kinpoku-san)*O. katorum* sp. nov.

Oroblemus caecus S. UÉNO et A. YOSHIDA, 1966

Oroblemus caecus S. UÉNO et A. YOSHIDA, 1966, Bull. Natn. Sci. Mus., Tokyo, 9, p. 80, figs. 1–2; type-locality: Mt. Iwaki-san.

Oroblemus coecus [sic]: CASALE & LANEYRIE, 1982, Mém. Biospéol., 9, p. 101, fig. 69.

Additional specimen examined. 1♂, Mt. Iwaki-san, 1,400 m alt. on Ohsawa, Iwaki-chô, Aomori Pref., NE Japan, 25–VII–1966, K. SUGA leg. (NSMT).

Notes. This is no doubt the most archaic of all the species hitherto known of the genus. It is unique in the pubescent eyes and the densely pubescent body surface. Its thickset body with subparallel elytra and square shoulders is characteristic of endogean existence, which suggests that the species is strictly localized on Mt. Iwaki-san and possibly also in its immediate vicinities. It is difficult to elucidate satisfactorily how such an archaic species as *O. caecus* can survive in the subalpine zone of the recent volcano. Further investigations on the nearby older mountains are needed for clarifying the derivation of this interesting species.

Oroblemus sparsepilifer S. UÉNO, 1975

Oroblemus sparsepilifer S. UÉNO, 1975, Bull. Natn. Sci. Mus., Tokyo, (A), 1, p. 115, fig. 1; type-locality: Kitaguni-yama of the Osoré-zan Mts. — CASALE & LANEYRIE, 1982, Mém. Biospéol., 9, p. 101.

Notes. No additional record; the holotype remains unique even at the present in spite of subsequent searches.

In describing this species, I noted that "perhaps a new genus or at least a new subgenus should be recognized for" it in view of the peculiar arrangement of pubescence, which is "ranged in longitudinal rows on the elytra and extremely reduced on the other parts of body." However, this comment has lost the firm basis with the discoveries of the two new species described in the present paper. In these southern species, the pubescence tends to be ranged in irregular longitudinal rows on the elytral intervals and has disappeared from the head and pronotum, though well preserved on the ventral surface in *O. katorum*. Therefore, they are intermediate between *O. caecus* and *O. sparsepilifer* so far as concerned with the mode of short hairs on the body surface. The true affinity of *O. sparsepilifer* can be confirmed beyond doubt if its male genitalia show the same characteristic type as those of the other species.

Oroblemus subsulcipes S. UÉNO, sp. nov.

(Figs. 1-3)

Length: 3.00 mm (from apical margin of clypeus to apices of elytra).

Related to *O. caecus*, but the pubescence is reduced, disappearing altogether on head and pronotum and sparse even on elytra, the head is narrower at the neck and has smaller and hardly pubescent eyes, the prothorax is less transverse and less contracted posteriorly, with a pair of discal setae and sharper hind angles, the elytra are less parallel-sided, less square at shoulders and much more evenly striate, with the marginal cilia reduced to humeral borders, the appendages are more slender, with the protibiae imperfectly grooved on the external face, the aedeagus is more flattened, with longer and thicker apical lobe, and the copulatory pieces are longer, with the right piece differently shaped at the apical portion.

Colour darker and more reddish than in *O. caecus*, light reddish brown, shiny; palpi, apical segments of antennae, ventral surface of hind body, and legs dark yellowish brown.

Head relatively small, transverse though moderately contracted both in front and behind; surface glabrous except for genae, which are sparsely covered with short hairs; frons and supraorbital areas gently convex; microsculpture distinct, mostly consisting of isodiametric meshes and partially of wide ones; eyes very small and flat, only one-third as long as genae, with imperfect facets and vestiges of a few microscopic hairs; genae rather strongly and evenly convex; neck wide though narrower than in the other species, with the anterior constriction distinct though relatively shallow; labrum widely emarginate at apex, with the central portion slightly bisinuate; mentum imperfectly fused with submentum, but the labial suture is traceable throughout, with the tooth in apical emargination very broad and deeply

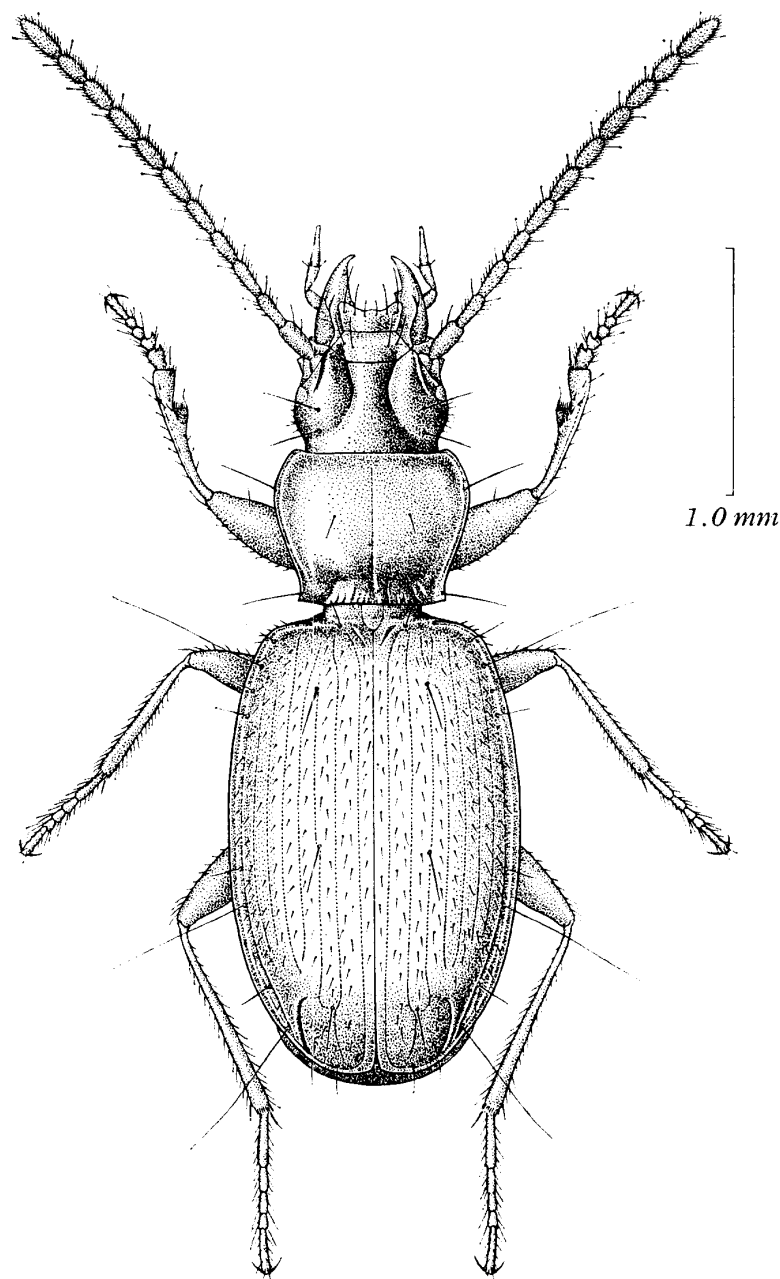


Fig. 1. *Oroblemus subsulcipes* S. UÉNO, sp. nov., ♂, from Mt. Chôkai-zan.

emarginate at apex; antennae fairly slender, reaching basal three-sevenths of elytra and very slightly dilated towards apices, segment 2 about as long as segment 4 and about six-sevenths as long as segment 3, segments 8–10 each oval and less than twice as long as wide, terminal segment about as wide as scape and a little longer than the latter.

Pronotum transverse, obviously wider than head, widest at about five-sevenths from base, and more gradually narrowed towards base than towards apex; PW/HW 1.31, PW/PL 1.28, PW/PA 1.35, PW/PB 1.32; surface moderately convex and wholly glabrous, with a

pair of short discal setae just before middle; microsculpture formed by irregularly transverse lines; sides rather narrowly bordered throughout, moderately arcuate in front, almost straight behind middle, distinctly sinuate at about one-sixth from base, and then slightly divergent again towards hind angles, which are sharp and laterally produced; apex slightly narrower than base, PA/PB 0.98, with front angles obtuse and only very slightly advanced; base obliquely truncated on each side; basal area longitudinally rugose.

Elytra oblong-ovate, much wider than prothorax, widest at about middle, and more gradually narrowed towards bases than towards apices; EW/PW 1.46, EL/EW 1.57; surface moderately convex, obviously less depressed than in the other species; microsculpture formed by fine transverse lines; shoulders distinct though not so square as in *O. caecus*, with pre-humeral borders almost perpendicular to the mid-line at the innermost portions; sides narrowly reflexed throughout, sparsely ciliated only at the humeral parts, feebly arcuate from shoulders to the level of the seventh umbilicate pore, and then moderately rounded to apices through slight preapical emargination; apices almost conjointly rounded though bearing a small re-entrant angle at suture; striae entire, becoming shallower towards the side though even striae 7 and 8 are clearly visible throughout, striae 1–5 more or less deepening near base, 8 deeply impressed behind the middle set of marginal umbilicate pores; scutellar striole short but distinct; apical striole short but deep, gently curved, turning inwards at the anterior end, and joining or almost joining stria 3; intervals flat, each sparsely covered with short suberect pubescence, which tends to form one or two irregular rows; apical carina distinct though obtuse.

Prosternum with only the vestiges of a few pubescence at the median part; sternites almost glabrous, each with a pair of ordinary setae. Legs not particularly long but fairly slender; protibiae moderately dilated towards apices, each with a longitudinal groove on the external face, which is distinct only at the middle part; tarsi fairly thin though not long.

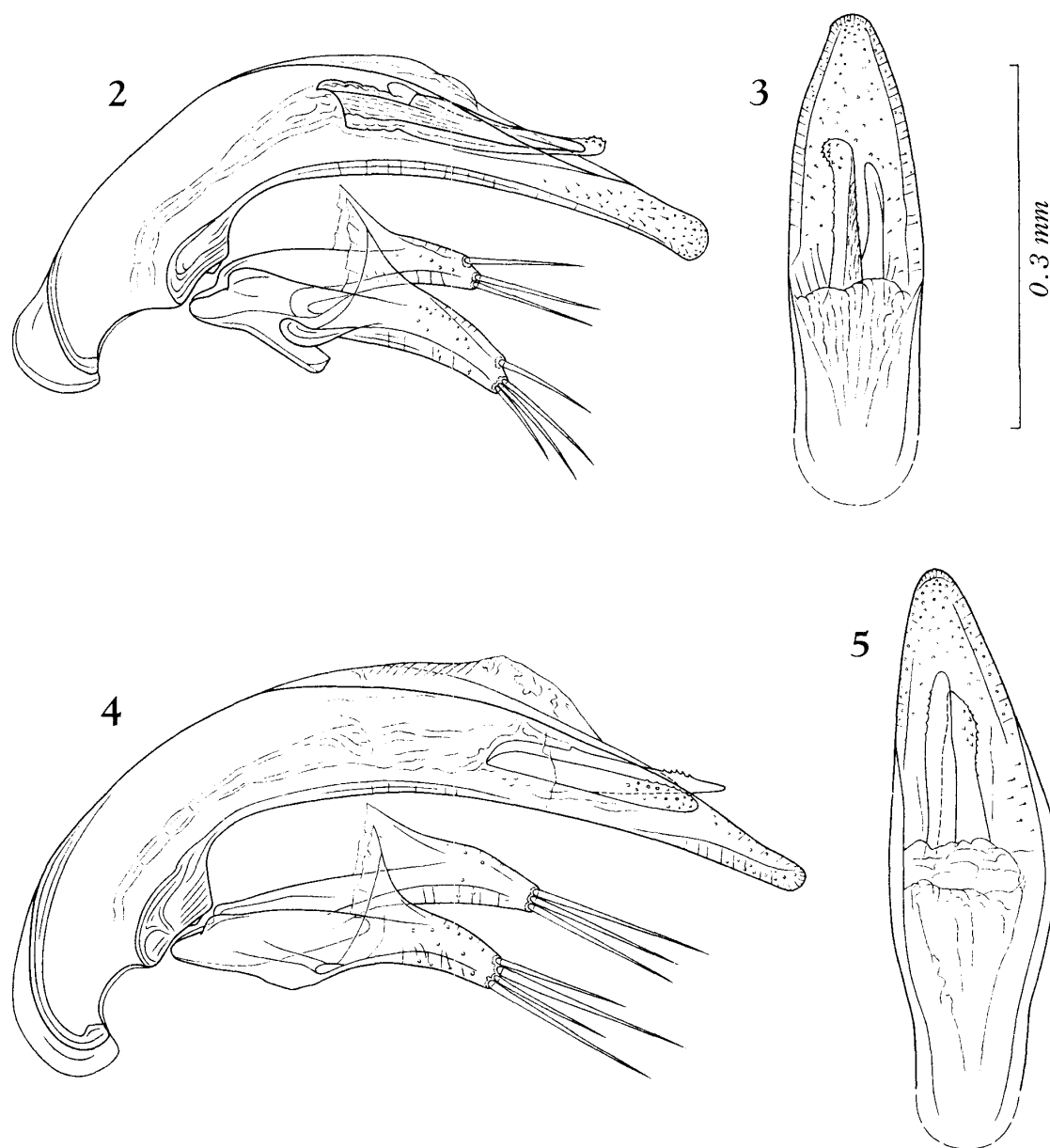
Male genital organ small though moderately sclerotized, basically similar to that of *O. caecus* but differing from the latter in the details already pointed out. Aedeagus about three-tenths as long as elytra, gently flattened, moderately arcuate, rather strongly curved ventrad at the basal part, and widely membranous on the dorsal surface; basal part elongate, with large basal orifice whose sides are widely emarginate; sagittal aileron large though hyaline; viewed dorsally, apical lobe nearly symmetrical, broad, gradually narrowed apicad, and widely rounded at the extremity; viewed laterally, apical lobe thick, straightly produced, and rounded at the extremity; ventral margin widely emarginate at middle in profile. Copulatory pieces long; right piece about four-ninths as long as aedeagus, long and narrow, roundly dilated at the apex, minutely tuberculose on the dorso-external face in apical third, and longitudinally rugulose on the internal face; left piece narrower and a little shorter than the right, lanceolate and somewhat twisted. Styles short and broad, left style much larger than the right, the former bearing four stout setae at apex, while the latter is furnished with only three apical setae in the holotype.

Female unknown.

Type-specimen. Holotype: ♂, 30–VIII–1982, S. UENO leg. Deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Type-locality. Mt. Chôkai-zan, 780 m in altitude on Fukura-guchi, in Yuza-chô of Yamagata Prefecture, northeastern Honshu, Northeast Japan.

Notes. Though considerably differing in external features, this new species is no doubt close to *O. caecus* of Mt. Iwaki-san, as is clearly demonstrated by the similarity of male genitalia. The localities of the two species are about 174 km distant in a bee-line, and are separated from each other at least by two large rivers with their alluvia and the intervening non-volcanic mountains. Other species intermediate between them may probably occur somewhere on the Shirakami Mountains or at the northwestern part of the Ôu Mountains, but so far we have been unable to find them out in spite of careful investigations.



Figs. 2-5. Male genitalia of *Oroblemus* spp.; left lateral view (2, 4), and apical part of aedeagus, dorso-apical view (3, 5). — 2-3. *O. subsulcipes* S. UÉNO, sp. nov., from Mt. Chôkai-zan. — 4-5. *O. katorum* S. UÉNO, sp. nov., from Mt. Donden-san on the Island of Sado.

The spot at which the unique type-specimen of *O. subsulcipes* was obtained was a small laval gully on the western slope of Mt. Chôkai-zan, an isolated recent volcano 2,230 m in height. The gully ran down through a beech forest, and was wet throughout though not containing flowing water. The trechine beetle was found from beneath a large stone embedded in the soil on the left bank of the gully. Mr. NISHIKAWA and I made every possible effort to obtain some more specimens of the beetle, but all our exertions ended in vain. At this particular place, we failed in finding out any specimens of *Trechiana* and *Epaphius*, which were known to occur on the other sides of the same volcano.

Oroblemus katorum S. UÉNO, sp. nov.

(Figs. 4–6)

Length: 3.35–3.60 mm (from apical margin of clypeus to apices of elytra).

Relatively large species of elongate body form, recognized at first sight on the presence of more than two pair of discal setae on pronotum and fairly long appendages. Also characterized by the voluminous head with fairly large eyes, basally contracted prothorax, rather densely pubescent elytra with long scutellar striole, pubescent sternites, and long flattened aedeagus with short copulatory pieces.

Body elongate and subparallel-sided, with fairly long antennae and legs. Colour yellowish brown to light reddish brown, shiny, usually with lighter elytra; antennae becoming lighter towards apices; palpi, ventral surface of hind body, and legs yellowish brown, usually concolorous with elytra.

Head large, voluminous, wider than long, and depressed above; dorsal surface glabrous, with feebly convex frons and supraorbital areas; microsculpture sharply impressed, mostly consisting of isodiametric meshes but partially of wide ones; eyes relatively large though perfectly flat, about two-thirds as long as genae, imperfectly faceted and provided with vestiges of several hairs; genae convex and covered with suberect hairs; neck very wide, with the anterior constriction deep and sharply marked at the sides; labrum transverse, with the apical margin widely emarginate and more or less distinctly bisinuate at the median part; mentum imperfectly fused with submentum though the labial suture is traceable throughout, with the tooth broad, porrect and widely bifid; antennae relatively long though stout, reaching basal four-ninths of elytra in ♂, basal three-sevenths of elytra in ♀, segment 2 about as long as segment 4 and about seven-eighths as long as segment 3, segments 8–10 each suboval and a little more than twice as long as wide, terminal segment the longest though narrower than scape.

Pronotum transverse subcordate, wider than head, widest at about five-sevenths from base, and gently contracted posteriad; PW/HW 1.20–1.25 (M 1.21), PW/PL 1.24–1.30 (M 1.27), PW/PA 1.30–1.33 (M 1.31), PW/PB 1.38–1.47 (M 1.43); surface moderately convex and devoid of pubescence, but provided with two or three short discal setae ranged in a longitudinal row on each side of median line; microsculpture formed by irregularly transverse lines though partially obliterated; sides moderately and evenly reflexed throughout, rather

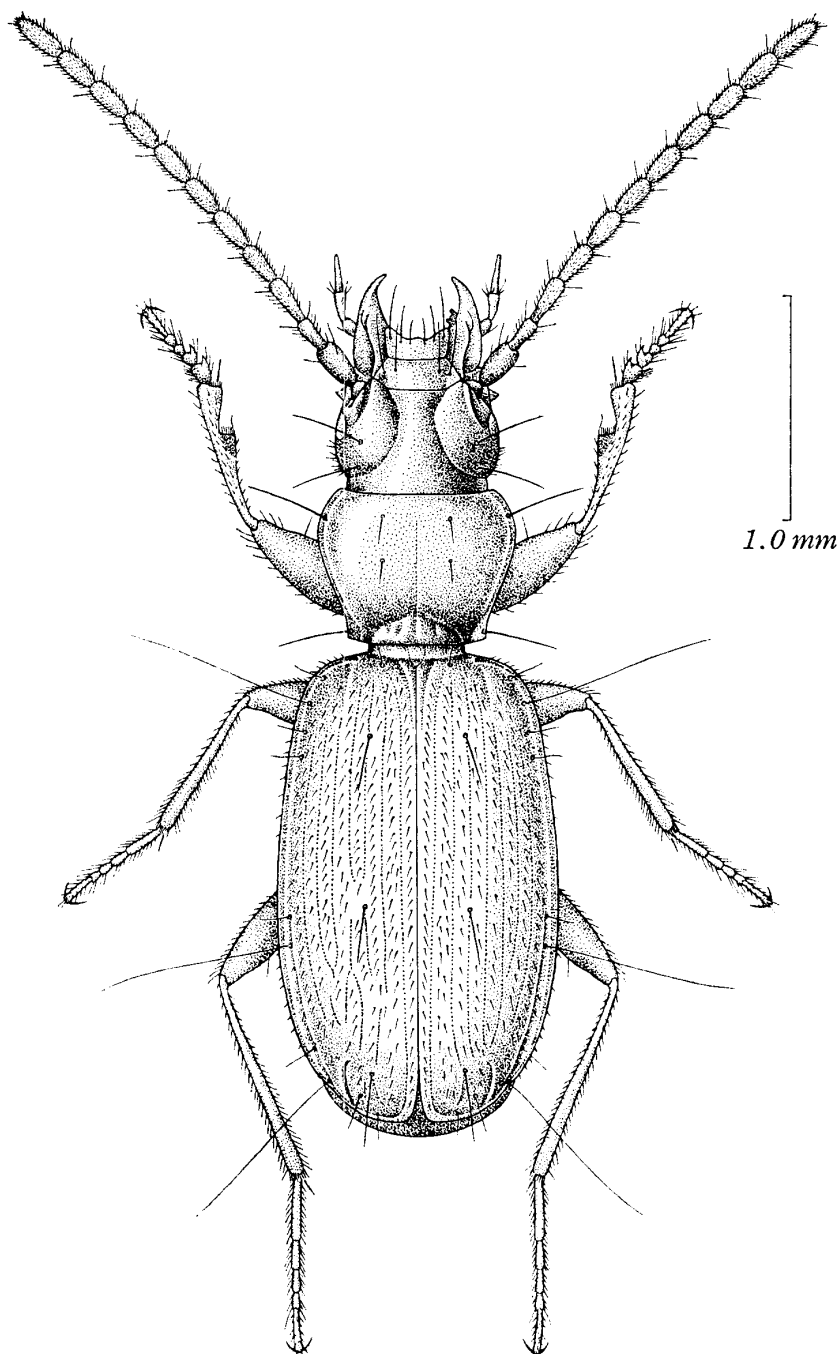


Fig. 6. *Oroblemus katorum* S. UENO, sp. nov., ♂, from Mt. Donden-san on the Island of Sado.

strongly arcuate in front, much less so behind middle or almost straight, distinctly but shallowly sinuate at a level between one-seventh and one-eighth from base, and then usually subparallel towards hind angles, which are either rectangular or a little obtuse, not produced outwards or backwards; apex more or less wider than base, PA/PB 1.04–1.13 (M 1.09), with front angles obtuse and hardly or only very slightly advanced; base nearly straight at middle and somewhat oblique on each side; basal area more or less uneven.

Elytra elongate, obviously wider than prothorax, much longer than wide, widest at about middle though almost parallel-sided; EW/PW 1.43–1.46 (M 1.44), EL/EW 1.61–1.67 (M 1.64); surface depressed, moderately convex only at the sides and in apical parts; micro-sculpture formed by fine transverse lines though mostly obliterated; shoulders distinct though rounded; prehumeral borders either perpendicular to the mid-line at the innermost portions or somewhat oblique; sides narrowly reflexed throughout, sparsely ciliated except for the median parts, very feebly arcuate from behind shoulders to the level of the seventh umbilicate pore, and then strongly rounded to apices through slight preapical emargination; apices separately rounded, forming a sharp re-entrant angle at suture; striae superficial though almost entire, moderately impressed on the disc but becoming much shallower towards the side, stria 5 deeply impressed near base, 8 almost effaced in proximal half but deeply impressed behind the fifth umbilicate pore; scutellar striae unusually long for a member of *Oroblemus*, almost reaching the level of the anterior dorsal pore; apical striae short but deep, moderately curved, usually turning inwards at the anterior end, and almost joining or even joining stria 3; intervals flat even on the disc, outer ones rather densely pubescent, but the pubescence becomes sparser and tends to be ranged in one or two irregular longitudinal rows on the disc; apical carina obtuse.

Prosternum sparsely covered with erect hairs; each sternite rather densely pubescent at the median part and usually provided with a pair of setae except for the anal, though an extra seta sometimes exists on one side. Legs relatively long and slender; protibiae gently dilated towards apices, entirely pubescent and not externally grooved; tarsi fairly long and thin.

Male genital organ small though moderately sclerotized, more elongate and more flattened than in the other species, with shorter copulatory pieces. Aedeagus a little less than one-third as long as elytra, much flattened in apical half, gently arcuate, widest at about or a little behind middle, and gradually narrowed towards apex; dorsal surface widely membranous; basal part long, strongly curved ventrad, with small basal orifice deeply emarginate at the sides; sagittal aileron well developed; viewed dorsally, apical lobe nearly symmetrical though inclined to the right, gradually narrowed apicad, and rather narrowly rounded at the extremity; viewed laterally, apical lobe either straight or slightly curved ventrad, and narrowly rounded at the extremity; ventral margin widely, though shallowly, emarginate at middle in profile. Copulatory pieces short, more or less lanceolate and somewhat twisted, right piece only three-tenths as long as aedeagus though still longer than the left, each being minutely tuberculose on the dorso-external face. Styles short and broad, subequal to each other, each bearing four apical setae, one of which is sometimes missing on the right style.

Type-series. Holotype: ♂, Mt. Donden-san, 6-IX-1982, S. UÉNO leg. Allotype: ♀, Mt. Donden-san, 7-IX-1982, S. UÉNO leg. Paratypes: 2♂♂, Mt. Donden-san, 7-IX-1982, S. UÉNO leg.; 1♀, Mt. Kinpoku-san, 5-IX-1982, Y. NISHIKAWA leg. All deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Localities of the type-series. Mt. Donden-san, 810–830 m in altitude on the NW slope (type-locality!), and Mt. Kinpoku-san, 930 m in altitude on the W slope, both on the Ohsado

Mountains, in Aikawa-chô (Niigata Pref.) on the Island of Sado, off central Honshu, Central Japan.

Notes. This is a remarkable new species rather isolated within the genus and most highly adapted to the hypogean existence among the four known species. Though it has relatively large eye-spots, its appendages become elongated and its habitats are much deeper than those of the others. It has been known from two stations at the highest part of the Ohsado Mountains on the Island of Sado, where the beetle lives in the upper hypogean zone 50 cm or more below the surface.

One of the two stations lies on the head called Donden-san (also called Tadara-miné), which is located at the northeastern part of the high ridge and is 940 m in altitude at the highest point. The trechine beetle was found only in the vicinity of the headspring of a small gully on the northwestern slope about 100 m below the summit. The gully flowed out from a talus densely covered with low deciduous shrubbery. As the beetle lived in this talus, it was very difficult to find out its exact habitat. We dug it down for two days with pickaxes and shovels, and barely obtained four specimens of the trechine, which were invariably found in narrow spaces between the moist soil and embedded gravel and were not particularly active when exposed.

On Mt. Kinpoku-san, which is 6.1 km distant to the southwest from Mt. Donden-san and is highest on the Ohsado Mountains (1,172 m in height), the single known specimen of the trechine beetle was dug out from a colluvium emplaced at the side of a road just below a small gully. We dug up the whole colluvium and searched for additional specimens, but all our painstaking efforts ended in vain.

This interesting new species is dedicated to the KATOs, who helped me in discovering it as well as greatly contributed to the clarification of the land fauna of the Island of Sado.

Discussion

As was repeatedly pointed out, *Oroblemus* is very important for the fact that it spans the wide gap between *Trechoblemus* and anophthalmic genera of the same phyletic series. In some other genus-complexes of the tribe Trechini, various stages of regressive evolution can be followed from dark winged forms with perfect eyes to pale wingless ones without functional eyes. A good example of this is the *Trechiamma* series, in which all the grades of adaptive modification have been known, from *Trechiamma alatus* S. UÉNO (1979, p. 202, figs. 1-4) with perfect eyes and inner wings to *Nothaphaenops* S. UÉNO (1978, pp. 2, 7) and *Nippophaphaenops* S. UÉNO (1971, p. 453) attaining to an extreme of hypogean adaptation. Another good example is the *Paratrechus* series of Central and northern South Americas, as recently illustrated by BARR (1982). In the *Trechoblemus* series, however, almost all the known forms are specialized subterranean inhabitants belonging to ten localized genera; no intermediaries connecting them with the fully winged oculate species of *Trechoblemus* and *Lasiotrechus* were known before the discovery of *Oroblemus caecus*.

On the other hand, *Oroblemus* is more archaic than *Trechoblemus* itself in certain features, and is rivalled in this respect only by *Oroblemites* of the Tian Shan Mountains. In

both the genera, the eyes are either pubescent or at least provided with the vestiges of several minute hairs, and in *Oroblemus*, the mandibular teeth are large and sharp as in the more primitive groups of the subfamily and the penultimate segment of maxillary palpus is provided with unusually developed setae. In describing the type-species of *Oroblemus*, we have laid undue emphasis on the peculiarity of its elytra, which are densely covered with very short pubescence as in many species of the tribe Perileptini. Though its generic value has been denied by subsequent discoveries of three more species, this is certainly an archaic feature and is also found in *Oroblemites tianshanicus* to a lesser extent, suggesting that they are descended from ancestral trechines which lived at the edges of running waters. The existing species of these genera are more or less subterranean and never ripicolous, but since they still retain distinct eye-spots, the history of their adaptation to the underground cannot be very long. This view is also supported by the fact that three out of the four known species of *Oroblemus* occur on recent volcanoes probably less than 10,000 years old.

It seems premature to discuss about the origin and dispersal of *Oroblemus* in the present state of our knowledge. The known species are rather diverse in external features, and though the most unmodified of all is *O. caecus*, this does not mean that the genus arose in the immediate vicinities of its type-locality. However, the native place of *Oroblemus* may have been somewhere on the Japan Sea side of northeastern Honshu, seeing that the two species, *O. sparsepilifer* and *O. katorum*, are more specialized than the other two and are localized in the small areas completely isolated from the mountains of the mainland. At any rate, the hitherto known species of the genus occur in four areas very widely apart from one another, the distance being about 95 km in a bee-line between the type-localities of *O. sparsepilifer* and *O. caecus*, about 174 km between those of *O. caecus* and *O. subsulcipes*, about 175 km between those of *O. subsulcipes* and *O. katorum*, and about 420 km between the two ends of the known range of generic distribution, that is, from Kitaguni-yama on the Shimokita Peninsula to Mt. Kinpoku-san on the Island of Sado. Still other species must remain undiscovered in the vast intervening areas. This can be readily surmised when *Oroblemus* is compared with the group of *Trechima oreas*, whose members have neither been known from the Shimokita Peninsula nor from the Island of Sado and yet become differentiated into at least eight species between Mt. Iwaki-san and the Iidé Mountains, which are about 320 km distant in a bee-line; the former is the type-locality of *O. caecus*, and the latter lie opposite to the Island of Sado (UENO, unpublished data).

In spite of these inadequate data, we can safely conclude that the distributional ranges of *Oroblemus* and *Kurasawatrechus*, which belong to the same phyletic series, are mutually exclusive. The latter genus, consisting only of anophthalmic species, is also insufficiently studied in northeastern Honshu, and though the approximate northern limit of its known distributional range is shown on the accompanying sketch map (Fig. 7), it may advance further north, especially onto the Ôu Mountains. It is, however, not plausible that certain *Kurasawatrechus* occur on the western side of northeastern Honshu in coexistence with *Oroblemus*. If such were the case, we should find by now at least one or two species of *Kurasawatrechus* somewhere on the coastal mountains facing the Japan Sea. Perhaps the dispersal of the *Oroblemus* ancestors took place mainly in the western coastal areas of north-

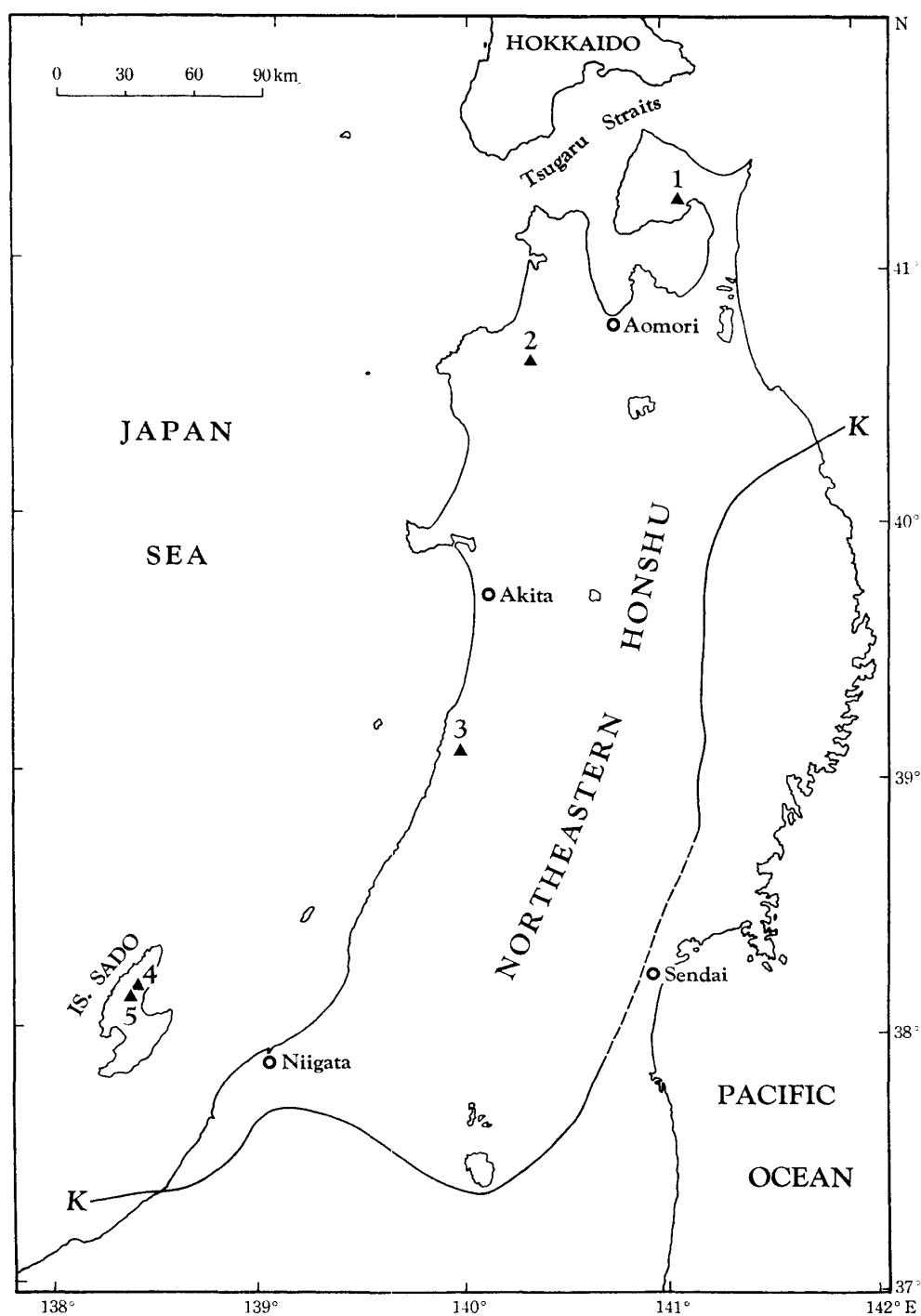


Fig. 7. Map showing the distribution of *Oroblemus*. The line K—K indicates the approximate northern limit of the known distributional range of *Kurasawatrechus*. — 1, *O. sparsepilifer* S. UÉNO (Kitaguni-yama of the Osoré-zan Mts.); 2, *O. caecus* S. UÉNO et A. YOSHIDA (Mt. Iwaki-san); 3, *O. subsulcipes* S. UÉNO, sp. nov. (Mt. Chôkai-zan); 4–5, *O. katorum* S. UÉNO, sp. nov. (4, Mt. Donden-san; 5, Mt. Kinpoku-san).

eastern Honshu. One of them somehow reached the Osoré-zan Mountains of the Shimokita Peninsula, then an island lying between Honshu and Hokkaido, successfully established a new colony there, and became differentiated into *O. sparsepilifer*.

It is difficult to determine at present when and by what route the ancestor of *O. katorum* immigrated into the Island of Sado, especially in view of the fact that the coastal areas of the mainland opposite to the island are within the distributional range of *Kurasawatrechus* (cf. UÉNO & BABA, 1965, 1974; also see Fig. 7). Both the summer wind and tidal current prevail in the opposite direction, and do not seem to have acted as effective carriers from the mainland to the island. Though further investigations in the mainland are needed for gaining a clue to solve this problem, my impression is that the invasion was effected in the Last Glacial Period when the Sado Straits were much narrower than they are now. It is said that the island was isolated through the last phase of regression, but the narrow water gap may not have formed an impassable barrier to the ancestral trechine, even if it was already modified to the same stage of adaptation as the existing brachypterous species, *Trechoblemus microphthalmus* S. UÉNO (1955, p. 404, fig. 1). Like the latter species, the ancestor of *O. katorum* may have inhabited marshy places and was apt to be carried for a long distance by floods of large rivers.

It seems worth noting in the last place that *O. katorum* of the Island of Sado is an inhabitant of the upper hypogean zone in contrast with the three northern species, which are typically endogean. This difference may have been resulted mainly from climatic reasons, since the Island of Sado is much milder in climate than the northern localities. Strong westerly wind prevailing at the heights of the island may also have helped in driving the trechine into the deeper part of the underground. However, *O. katorum* is rather exceptional for an upper hypogean species, as it has distinct eye-spots with imperfect facets. This seems to suggest that the trechine is not an old dweller of the present habitat but was primarily endogean until rather recently.

要 約

キタメクラチビゴミムシ類 *Oroblemus* は、アトスジチビゴミムシ群 *Trechoblemus* series に含まれる小さい属を形成し、これまでは本州北端部に分布する2種のみが知られていた。アトスジチビゴミムシ群では、完全な複眼とよく発達した後翅をもち、北半球の温帯に広く分布する属と、複眼も後翅も完全になくなって分布域の局限されたものとがよく知られているが、痕跡的な複眼をもち、ほかの点でも中間の適応段階にあるキタメクラチビゴミムシ類に比肩できるのは、天山山脈のソビエト側から知られる *Oroblemites* の1属1種があるに過ぎない。しかもこれらの2属は、その祖型とみられるアトスジチビゴミムシ属よりさらに原始的な形質をとどめているので、単に属群の中の系統をたどるのに役立つだけでなく、属群自体の由来を追究するためにも貴重な存在である。

しかし、キタメクラチビゴミムシ属の既知の2種はいずれも個体数が少ない上に、第二の種は雌のみしか知られていないので、この属に関する十分な解析がなされたとはいえなかった。昨年になって、同属の種があい次いで2種発見され、属内の変異の様子がある程度まで明らかになるとともに、属の分布域もほぼ推察できるようになった。これらの新種を含めて、現在知られているキタメクラチビゴミムシ類の種名と産地は次のようになる。

- 1) イワキメクラチビゴミムシ *O. caecus* S. UÉNO et A. YOSHIDA —— 青森県岩木山
- 2) シモキタメクラチビゴミムシ *O. sparsepilifer* S. UÉNO —— 青森県恐山北国山
- 3) チョウカイメクラチビゴミムシ *O. subsulcipes* S. UÉNO, sp. nov. —— 山形県鳥海山

4) サドメクラチビゴミムシ *O. katorum* S. UÉNO, sp. nov. — 新潟県佐渡ドンデン山および金北山

図7からも明らかなように、これらの4種は、直線距離で420 kmに及ぶ広い地域に散在し、外部形態もとくに体表をおおう細毛の分布にいちじるしい拡散を示すので、種相互の系統関係や分布の経路を正しく把握するのは非常にむづかしい。しかし、同じ属群に含まれるクラサワメクラチビゴミムシ属 *Kurasawatrechus* の種と同所的に分布しないことは、ほぼ確実だと考えられるので、キタメクラチビゴミムシ類の分布域は、東北地方の日本海側を中心に細長く延びているのだろう。また、これまでに知られている北限と南限、つまり下北半島と佐渡が、おそらく属の分布域の両端に当たるものと思われるので、未発見の種の産地がこの範囲から大きくはずれる可能性はほとんどない。

キタメクラチビゴミムシ類は、おそらく東北地方日本海側の山地で分化した属で、地下の環境にすみついた時期もそう古いことではなかったのだろう。既知種のうちのひとつが、佐渡の地下浅層に隔離されている、という事実は注目に値するが、ほかの種のすべてが新しい火山で地中性になっている、という事実とともに、この属の起源が比較的新しいことを示す証拠のひとつだ、と考えてよさそうに思われる。

References

- BARR, T. C., JR., 1982. The trechine beetles of the *Paratrechus* series in Mexico and Central America, with special reference to the cave species (Coleoptera: Carabidae: Trechinae). *Assoc. Mex. Cave Stud. Bull.*, 8 / *Texas mem. Mus. Bull.*, 28: 193–236.
- CASALE, A., & R. LANEYRIE, 1982. Trechodinae et Trechinae du monde. Tableau des sous-familles, tribus, séries phylétiques, genres, et catalogue général des espèces. *Mém. Biospéol.*, 9: i+1–226.
- UÉNO, S.-I., 1955. Marine insects of the Tokara Islands. VII. New species and new subspecies of the subfamily Trechinae (Coleoptera, Harpalidae). *Publ. Seto mar. biol. Lab.*, 4: 403–413.
- UÉNO, S.-I., 1958. Two new trechids of *Kurasawatrechus*-group found in the limestone caves of Japan (Coleoptera, Harpalidae). *Jap. J. Zool.*, 12: 123–131.
- UÉNO, S.-I., 1969. *Stygiotrechus* (Coleoptera, Trechinae), an assemblage of remarkably diversified blind trechines. *Bull. Natn. Sci. Mus., Tokyo*, 12: 485–515.
- UÉNO, S.-I., 1971. Occurrence of an aphaenopsoid trechine beetle in Japan. *Ann. Spéléol.*, 26: 451–462.
- UÉNO, S.-I., 1973. A new endogean trechine beetle from Central Japan, with notes on the Japanese species of the *Stygiotrechus* complex. *Bull. Natn. Sci. Mus., Tokyo*, 16: 23–30.
- UÉNO, S.-I., 1975. Occurrence of a new endogean trechine beetle in the Shimokita Peninsula, northern Japan. *Ibid.*, (A), 1: 115–118.
- UÉNO, S.-I., 1976. Occurrence of *Stygiotrechus* (Coleoptera, Trechinae) in the Island of Shikoku, Japan. *Ibid.*, (A), 2: 277–284.
- UÉNO, S.-I., 1978. The cave trechines of the genus *Allotrechiana* (Coleoptera, Trechinae). *J. speleol. Soc. Japan*, 3: 1–13.
- UÉNO, S.-I., 1979. Occurrence of a new alate species of *Trechiana* (Coleoptera, Trechinae) in Taiwan. *Bull. Natn. Sci. Mus., Tokyo*, (A), 5: 201–206.
- UÉNO, S.-I., 1980. New *Stygiotrechus* (Coleoptera, Trechinae) from non-calcareous areas. *J. speleol. Soc. Japan*, 5: 1–12.
- UÉNO, S.-I., & K. BABA, 1965. Occurrence of a new *Kurasawatrechus* (Coleoptera) in an endogean habitat. *Bull. Natn. Sci. Mus., Tokyo*, 8: 17–21, pl. 1.
- UÉNO, S.-I., & K. BABA, 1974. *Kurasawatrechus kyokoae*, a new anophthalmic trechine beetle found in a sandstone cave of Japan. *Annot. zool. Japon.*, 47: 194–198.
- UÉNO, S.-I., & J. PAWŁOWSKI, 1981. A new microphthalmic trechine beetle of the *Trechoblemus* complex from Tian Shan. *Annot. zool. Japon.*, 54: 147–155.
- UÉNO, S.-I., & A. YOSHIDA, 1966. A presumptive prototype of the *Trechoblemus* complex (Coleoptera, Trechinae). *Bull. Natn. Sci. Mus., Tokyo*, 9: 75–83.